



Health Information Technology

An Assessment of Maryland Acute Care Hospitals

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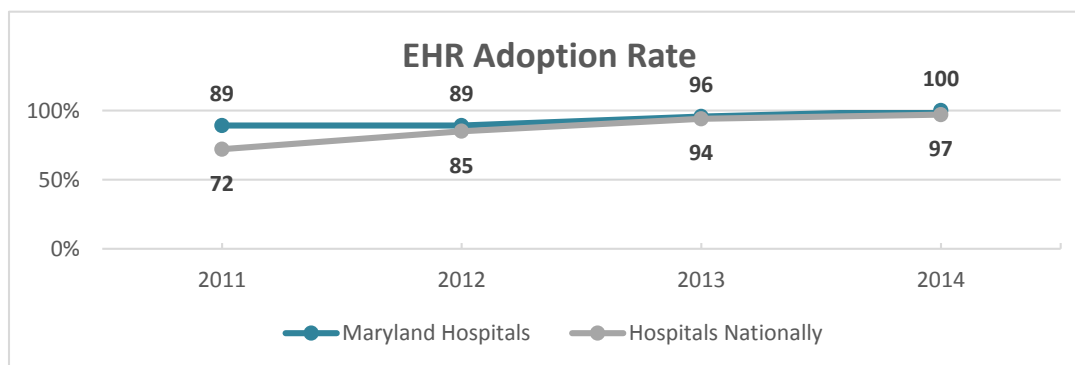
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INTRODUCTION

Adoption of health information technology (health IT) has increased in Maryland and nationally since the passage of the Health Information Technology for Economic and Clinical Health (HITECH) Act in 2009.¹ Health IT encompasses an array of technologies that store, share, and analyze health information.² Widespread adoption and meaningful use of health IT across the care continuum is key to achieving the goals of health care reform, which includes improving health care quality, efficiency, and patient safety and reducing health care costs.³ These goals can be realized through the implementation of electronic health records (EHRs), health information exchange (HIE), and telehealth. EHRs make clinical information⁴ available electronically and offer evidence based tools to assist in the clinical decision-making process. When used effectively, EHRs can lead to better coordinated and patient-centered care.⁵ HIE enables patients' EHRs to be available at the point of care delivery. Telehealth provides an opportunity to expand health care delivery and improve care coordination by connecting providers remotely while increasing access to care.

The HITECH Act established the Medicare and Medicaid EHR Incentive Programs, which accelerated EHR adoption by allowing eligible professionals, hospitals, and critical access hospitals (collectively, "eligible providers") to receive financial incentive payments beginning in 2011 for their adoption and meaningful use of certified EHR technology.^{6, 7} Incentive payments are based on eligible providers ability to demonstrate meaningful use across three stages⁸ by meeting certain measurement thresholds that range from recording patient information as structured data to exchanging summary of care records. Prior to the HITECH Act, Maryland acute care hospitals (referred to as "hospitals" herein) moderately used EHRs. While 77 percent of hospitals had adopted an EHR in 2008, only about 50 percent had fully implemented an EHR in all hospital departments. As of 2014, all hospitals have a certified EHR, and approximately 77 percent have implemented an EHR within all hospital departments.



Note: N=46 (2011); N=46 (2012); N=46 (2013); and N=47 (2014)

¹ The HITECH Act, enacted as part of the American Recovery and Reinvestment Act of 2009 (Pub.L. 111-5), was signed into law on February 17, 2009.

² HealthIT.gov, *Basics of Health IT*. Available at: www.healthit.gov/patients-families/basics-health-it.

³ Department of Health and Human Services, *Report to Congress*, October 2014. Available at: www.healthit.gov/sites/default/files/rtc_adoption_and_exchange9302014.pdf.

⁴ Clinical information includes but is not limited to patient medical history, diagnoses, medications, treatment plans, immunization dates, allergies, radiology images, and laboratory results.

⁵ HealthIT.gov, *What is an electronic health record (EHR)?* Available at: www.healthit.gov/providers-professionals/faqs/what-electronic-health-record-ehr.

⁶ Ibid.

⁷ The Office of the National Coordinator for Health Information Technology (ONC) Health IT Certification Program is a voluntary program for the certification of health IT standards, implementation specifications and certification criteria. For more information, visit: www.healthit.gov/policy-researchers-implementers/about-onc-health-it-certification-program.

⁸ The three stages of meaningful use include: Stage 1 (2011-2012) data capture and sharing; Stage 2 (2014) advance clinical processes; and Stage 3 (2016) improved outcomes.

Optimized use of health IT is a necessary prerequisite to transform care delivery into a patient-centric approach where electronic access to clinical information is used to improve health care quality and patient outcomes. In January 2016, the Centers for Medicare and Medicaid Services (CMS) announced plans to augment the Medicare EHR Incentive Program by linking payments to improvements in patient outcomes.⁹ While these plans are shifting the focus of how to achieve optimized use of health IT, the hallmarks of meaningful use, which include care coordination, patient engagement, and information exchange, will continue to remain crucial as value-based reimbursement models continue to evolve.¹⁰ While CMS policies regarding optimized use of health IT have not yet been defined, they are expected to support Maryland hospitals that now operate under a global budget where payments are largely based on performance.^{11, 12} Pay-for-performance promotes improvements in health care quality, efficiency, and overall value through increased use of health IT.

ABOUT THE ASSESSMENT

This report details adoption and use of health IT among all 47 hospitals in Maryland. The report includes specific information on hospitals' implementation of EHRs, computerized physician order entry (CPOE), clinical decision support (CDS), electronic medication administration records (eMARs), bar code medication administration (BCMA), electronic prescribing (e-prescribing), patient portals, HIE, and telehealth.¹³ Hospitals' use of population health management tools and their participation in the Medicare and Medicaid EHR Incentive Programs are also highlighted.

LIMITATIONS

Hospital Chief Information Officers (CIOs) self-reported data used in this assessment for calendar year 2014. The Maryland Health Care Commission (MHCC) collected the data through an online questionnaire and did not audit the data for accuracy. CIOs' interpretation of the survey questions may vary, which could influence survey results.¹⁴ National benchmark data noted in this report is not census level data and varies in the survey methodology used and time period evaluated. Data for national comparisons does not exist for certain technologies; not all Maryland results are benchmarked within this report.

HEALTH IT ADOPTION

EHR Vendor Market Share

All hospitals have implemented an EHR. Meditech, Cerner, and Epic and are among the top three vendors used by over 80 percent of hospitals. These are the top three vendors used by hospitals nationally that participate in the Medicare and Medicaid EHR Incentive Programs.¹⁵ One health system stated plans to transition all of its hospitals to Epic over the next couple of years.¹⁶ This transition will result in Epic

⁹ Healthcare IT News, *Meaningful use will likely end in 2016, CMS chief Andy Slavitt says*, January 2016. Available at: www.healthcareitnews.com/news/meaningful-use-will-likely-end-2016-cms-chief-andy-slavitt-say.

¹⁰ The Advisory Board Company, *Meaningful use will evolve*, January 2016. Available at: www.advisory.com/daily-briefing/2016/01/14/is-meaningful-use-ending-not-quite.

¹¹ Nearly 40 percent of Medicare beneficiaries discharged from acute care hospitals are discharged to post-acute care settings, including rehabilitation hospitals and skilled nursing facilities.

¹² Gage B, Morley M, Ingber M, Smith L., *Post-Acute Care Episode Expanded Analytic File*, April 2011. Available at: aspe.hhs.gov/health/reports/2011/pacexpanded/index.shtml.

¹³ See Appendix C for health IT diffusion by hospital.

¹⁴ See Appendix A for a listing of all survey questions.

¹⁵ HealthIT.gov, *EHR Vendors Reported by Hospitals Participating in the CMS EHR Incentive Programs*, March 2015. Available at: dashboard.healthit.gov/quickstats/pages/FIG-Vendors-of-EHRs-to-Participating-Hospitals.php.

¹⁶ The health system also indicated plans to transition its faculty and community-based physicians to Epic.

becoming the EHR vendor most widely used among hospitals in the State. Cerner and Meditech continue to have a sizable market share as compared to the other EHR vendors in Maryland (Table 1).

Table 1: EHR Vendor Market Share		
EHR Vendor	Share %	
	2014	2018 Outlook
Meditech	36	23
Cerner	28	28
Epic	19	32
McKesson	6	6
Allscripts	4	4
Healthland	2	2
Siemens	2	2
Computer Programs & Systems, Inc.	2	2
Peri-gen*	2	2

* Percentages do not equal 100 because one hospital uses Peri-gen in conjunction with Cerner.

Core EHR Components

Hospitals report using CPOE, CDS, eMARs, BCMA, and e-prescribing, which are core components of a certified EHR and necessary to achieve meaningful use (Table 2).^{17, 18} The Office of the National Coordinator for Health IT (ONC) is tasked with establishing EHR certification criteria.¹⁹ ONC modifies certification criteria in conjunction with the stages of meaningful use, thus as hospitals continue to participate in the EHR Incentive Programs, hospital adoption of these core EHR components has increased over time. Adoption of e-prescribing to route discharge medications to pharmacies located outside of the hospital has increased the most since 2010. This increase can be attributed to meaningful use Stage 2 where e-prescribing is one of six menu objectives; hospitals are required to report on three of the six menu objectives.^{20, 21}

In addition to meaningful use, the implementation of e-prescribing continues to be a priority for hospitals to improve efficiencies and patient safety. Use of e-prescribing improves clinical workflows and reduces the chance of a pharmacy misinterpreting a handwritten paper prescription and dispensing the incorrect drug. Additionally, patient medication adherence is likely to improve by 10 percent when prescriptions are filled

¹⁷ See Appendix B for definitions of these technologies.

¹⁸ See Appendix C for health IT diffusion by hospital.

¹⁹ The federal government does not engage in certifying EHR products. ONC appoints ONC-Authorized Testing and Certification Bodies (ONC-ATCBs) to certify that EHR products have met the certification criteria. ONC began accepting applications for organizations seeking to become ONC-ATCBs in June 2010.

²⁰ Eligible hospitals are required to attest to select core and menu objectives in order to receive incentive payments. For information on Stage 1 objectives, visit: www.cms.gov/Regulations-and-Guidance/Legislation/EHRIncentivePrograms/Downloads/Hosp_CAH_MU-TOC.pdf. For information on Stage 2 objectives, visit: www.cms.gov/Regulations-and-Guidance/Legislation/EHRIncentivePrograms/Downloads/Stage2_MeaningfulUseSpecSheet_TableContents_EligibleHospitals_CAHs.pdf.

²¹ Depending on when a hospital initiated participation in the Medicare & Medicaid EHR Incentive Programs, the earliest they were required to meet meaningful use Stage 2 was Federal Fiscal Year 2014 (i.e. October 2013 - September 2014).

electronically. Medication adherence can help reduce the chance of readmissions.^{22, 23} The 68 percent adoption rate is expected to increase as 12 of the 15 hospitals that did not have the capability to e-prescribe in 2014 indicated they were in the process or had plans to implement the technology by the end of 2015.²⁴

Table 2: Hospital Use of Core EHR Components						
%						
Technology		CPOE	CDS	eMARs	BCMA	e-Prescribing
Adoption Rate	2010 N=44	77	70	79	62	19
	2014 N=47	100	100	100	98	68
Growth Rate ²⁵		7	7	6	12	37

Patient Portals

Patient portal adoption increased most rapidly in recent years, growing at a rate of roughly 92 percent from 2012 to 2014 (Figure 1). This increase can be attributed to meaningful use Stage 2, which requires 50 percent of patients discharged from the inpatient or emergency department to have the ability to view, download, and transmit (VDT) their health information electronically within 36 hours of discharge. A patient portal is a secure website offering various functionalities to patients, such as the ability to access to their health information (e.g. medications, immunizations, laboratory results, etc.), e-mail their provider, schedule appointments, and view educational materials. Patient portals can be considered a core EHR component. Meaningful use does not specify the means that hospitals are to provide patients with electronic access to their health information; however, patient portals are most commonly used by hospitals in achieving the VDT measure.

Effective implementation of a patient portal can help promote patient engagement by supporting communication between patients and providers and facilitating education about health conditions. Patient engagement will become increasingly important as health care transitions to value-based care delivery models.^{26, 27} Nationally, use of patient engagement functionalities are becoming more prevalent among hospitals; these functionalities allow patients to request prescription refills and provide patient-generated data, among other things.²⁸ Hospitals offer a variety of these functionalities to patients via their patient portals. The top three functionalities provided by roughly 90 percent of hospitals that have a patient portal include: (1) access visit summary; (2) check test results; and (3) download information on hospital

²² A Surescripts study found that hospitals can save upwards to \$100K annually for small facilities and over \$1M annually for large facilities.

²³ Healthcare Business & Technology, *Benefits of e-prescribing for hospitals*, December 2015. Available at: www.healthcarebusinesstech.com/e-prescribing-hospitals/.

²⁴ Three hospitals were undecided about an e-prescribing implementation strategy.

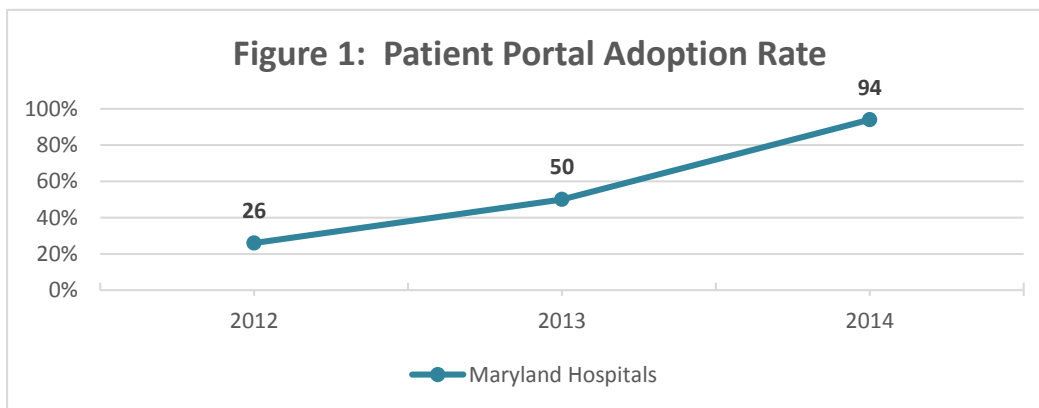
²⁵ The compound annual growth rate is a measure of growth over multiple periods.

²⁶ HealthIT.gov, *Patient Portal Increases Communication Between Patients and Providers*, 2011. Available at: www.healthit.gov/providers-professionals/blackstone-valley-community-health-care-case-study.

²⁷ In addition to the expansion of health insurance coverage, the Affordable Care Act includes provisions that aim to improve the delivery and reimbursement of health care. Patient Centered Medical Homes and Accountable Care Organizations are examples of comprehensive and coordinated care models shifting from episodic, sick-care encounters to a proactive and continuous care delivery cycle with the ultimate goal of improving quality and reducing costs. Characteristics embodied in these models include patient engagement, care teams, and population health management.

²⁸ HealthIT.gov, *U.S. Hospital Adoption of Patient Engagement Functionalities*, 2014. Available at: dashboard.healthit.gov/quickstats/pages/FIG-Hospital-Adoption-of-Patient-Engagement-Functionalities.php.

admission (Table 3). The availability of these features can be attributed to hospital efforts to meet meaningful use VDT requirements.



Note: N=46 (2012); N=46 (2013); and N=47 (2014)

Table 3: Patient Portal Functionalities N=44	
Administrative	%
E-mail provider*	30
Pay bill*	32
Pre-register for services*	14
Request electronic copy of medical record	27
Update insurance information*	16
Clinical	%
Accept patient-generated data *	16
Access visit summary	93
Check test results	91
Download information on hospital admission	86
Renew/refill prescription*	27
Self-management tools for chronic conditions*	20

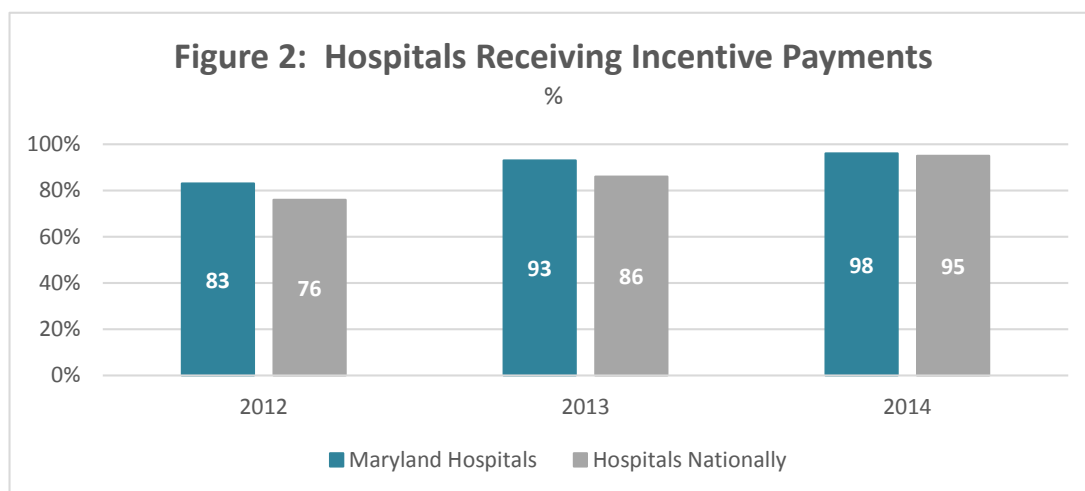
Notes: N=44 represents the number of hospitals that have implemented a patient portal; an asterisk () denotes those functionalities that may go above the requirements of meaningful use, depending on how each is implemented.*

EHR Incentive Programs

Incentive payments from the Medicare and Medicaid EHR Incentive Programs are often used by hospitals to fund existing technology and acquire additional health IT necessary to meet meaningful use requirements.²⁹ As of 2014, most eligible hospitals in Maryland and nationally have received at least one incentive payment

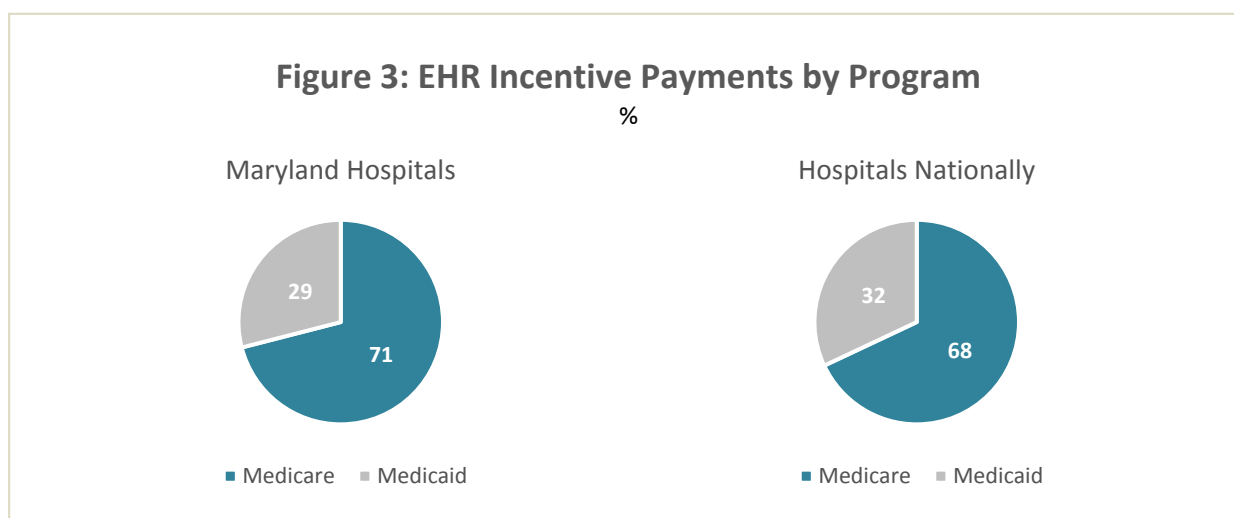
²⁹ Healthcare IT News, *Most incentive money spent on more IT*, March 2013. Available at: www.healthcareitnews.com/news/most-incentive-money-spent-more-it.

(Figure 2). Collectively, these hospitals have received over \$18 billion in incentive payments. In Maryland, approximately \$272 million in incentive payments has been distributed to hospitals.^{30, 31}



Note: N=46 (2012); N=46 (2013); and N=47 (2014)

Hospitals can earn incentive payments from both Medicare and Medicaid if they qualify and meet specific program requirements, receiving upwards of \$1 million in a single year.³² Medicare has paid the majority of incentive payments to all hospitals in Maryland and nationally (Figure 3).³³ The last year eligible hospitals could register to participate in the Medicare program was 2014 and payments will stop in 2016. The Medicaid program allows eligible hospitals to register through 2016, and payments will continue through 2021.



³⁰ See Appendix C for a rank listing of hospitals from highest to lowest amount of incentive payments received and the breakdown of the share of incentive payments among health systems and community hospitals.

³¹ Holy Cross Germantown Hospital is the only hospital in Maryland that has not yet received an incentive payment. The hospital began operations in November 2014 and has indicated future plans to attest to the Medicare EHR Incentive Program.

³² Medicaid offers incentive payments if hospitals adopt/implement/upgrade (AIU) certified EHR technology in their first year of participation. Hospitals must have at least a 10 percent Medicaid patient population.

³³ CMS, *EHR Incentive Program*, August 2014. Available at: www.cms.gov/Regulations-and-Guidance/Legislation/EHRIncentivePrograms/Downloads/August2014_SummaryReport.pdf.

The Medicare and Medicaid EHR Incentive Programs are expected to distribute a total of \$30 billion in incentive payments from 2011 through 2019.³⁴ The U.S. Department of Health and Human Services Office of the Inspector General (OIG) has made it a priority to audit the appropriateness of payments by CMS and State agencies.³⁵ CMS conducts pre and post payment audits for Medicare while states typically perform audits for Medicaid.³⁶ During the audit process, hospitals are required to provide all relevant supporting documentation to verify their meaningful use attestations.³⁷ Incentive payments are recouped if a determination is made that meaningful use was not achieved or documented properly by the hospital. Since 2011, CMS has conducted Medicare audits on about 32 percent of Maryland hospitals, and there were no adverse findings. Medicaid audits of Maryland hospitals have not been conducted. Nationally, there have been over 600 audits of hospitals, and of these audits, there was a 4.9 percent failure rate.^{38, 39, 40}

HEALTH INFORMATION EXCHANGE

Health care reform requires greater collaboration between hospitals and ambulatory providers and an increased reliance on health IT.⁴¹ HIE enables the electronic exchange of clinical information between hospitals, ambulatory providers, and laboratory and radiology centers, allowing information to be available at the point of care delivery.⁴² Prior to the HITECH Act, only about 15 percent of hospitals nationally exchanged health information with providers that were unaffiliated with their hospital. Since 2008, this percent has nearly quadrupled with nearly 62 percent of hospitals exchanging clinical data with unaffiliated providers involved in care delivery.⁴³

Statewide HIE

HIE diffusion among hospitals statewide has continued to increase over the last six years. Initially, hospitals made admission, discharge, and transfer (ADT) data available to the State-Designated HIE, the Chesapeake Regional Information System for our Patients (CRISP).⁴⁴ In addition to ADT information, hospitals now send laboratory, radiology, and transcribed (i.e. clinical summaries) reports to CRISP. Since 2013, hospital submission of radiology, transcribed, and laboratory reports increased by 22 percent. In April 2014,

³⁴ Acumen Physician Solutions, Meaningful Use: Meet the new auditor – the OIG, June 2015. Available at: acumenmd.com/blog/meaningful-use-meet-the-new-auditor-the-oig/.

³⁵ Previously, the majority of audits were conducted by a CMS contracted company (Figliozi & Company). OIG found that CMS and states lacked adequate data to verify participants' self-reported attestations about their eligibility and meaningful use of EHRs, which resulted in them creating a work plan for the 2015 fiscal year. For more information on OIG's 2015 Work Plan, visit: oig.hhs.gov/reports-and-publications/archives/workplan/2015/FY15-Work-Plan.pdf.

³⁶ Maryland delegated their Medicaid post-payment auditing authority to CMS.

³⁷ Supporting documentation should be retained for six years post attestation. For more information, visit: www.cms.gov/regulations-and-guidance/legislation/ehrincentiveprograms/downloads/ehr_supportingdocumentation_audits.pdf.

³⁸ The audit failure rate is only indicative of the percent of hospitals that failed an audit and had incentive payments recouped. It is possible that some audit determinations were reversed by hospital appeals.

³⁹ Eligible hospitals have a much lower audit failure rate than eligible providers as most hospitals have resources solely dedicated to meaningful use whereas many smaller practices do not.

⁴⁰ HITECH Answers, *EPs and EHs Audited for Meaningful Use*, October 2014. Available at: www.hitechanswers.net/eps-ehs-audited-meaningful-use/.

⁴¹ The Commonwealth Fund, *The Affordable Care Act's Payment and Delivery System Reforms: A Progress Report at Five Years*, May 2015. Available at: www.commonwealthfund.org/publications/issue-briefs/2015/may/aca-payment-and-delivery-system-reforms-at-5-years.

⁴² EHR Intelligence, *Hospital Health Information Exchange by the Numbers*, February 2016. Available at: ehrintelligence.com/news/hospital-health-information-exchange-by-the-numbers.

⁴³ ONC, *Health Information Exchange among U.S. Non-federal Acute Care Hospitals: 2008-2014*, April 2015. Available at: www.healthit.gov/sites/default/files/data-brief/ONC_DataBrief24_HIE_Final.pdf.

⁴⁴ In 2009, MHCC and the Health Services Cost Review Commission designated CRISP as the State-Designated HIE. For more information, visit: mhcc.maryland.gov/mhcc/pages/hit/hit_hie/hit_hie.aspx.

hospitals began sending continuity of care documents (CCDs) to CRISP.⁴⁵ A CCD consolidates a patient's clinical information into an electronic summary that can be shared among providers and integrated into an EHR. All hospitals have authorized users that search for clinical information using the CRISP Query Portal (Table 4).⁴⁶

Table 4: Hospital Data Submission to CRISP		
N=47		
Type of Data	2013 %	2014 %
ADT	100	100
Radiology	76	98
Transcribed	72	94
Laboratory	67	89
CCDs	N/A	30

Participation with Other HIEs

Five hospitals participate with one of four other HIEs in addition to CRISP. These HIEs are hospital-owned and include: Adventist Healthcare⁴⁷; Calvert Memorial Hospital; Frederick Memorial Hospital; and Peninsula Regional Medical Center. COMAR 10.25.18, *Health Information Exchanges: Privacy and Security of Protected Health Information*, requires organizations that meet the definition of an HIE to comply with benchmarks around privacy and security of electronic health information and register with MHCC annually.⁴⁸ These HIEs typically provide regional services, often within a hospital's service area, to help facilitate the exchange of clinical information among hospitals or practices.⁴⁹ Laboratory and radiology reports are most commonly exchanged by hospitals using these HIEs (Figure 4). Hospitals generally indicate that enabling ambulatory practices in their service area to have access to these reports enhances the relationship between hospitals and ambulatory providers.

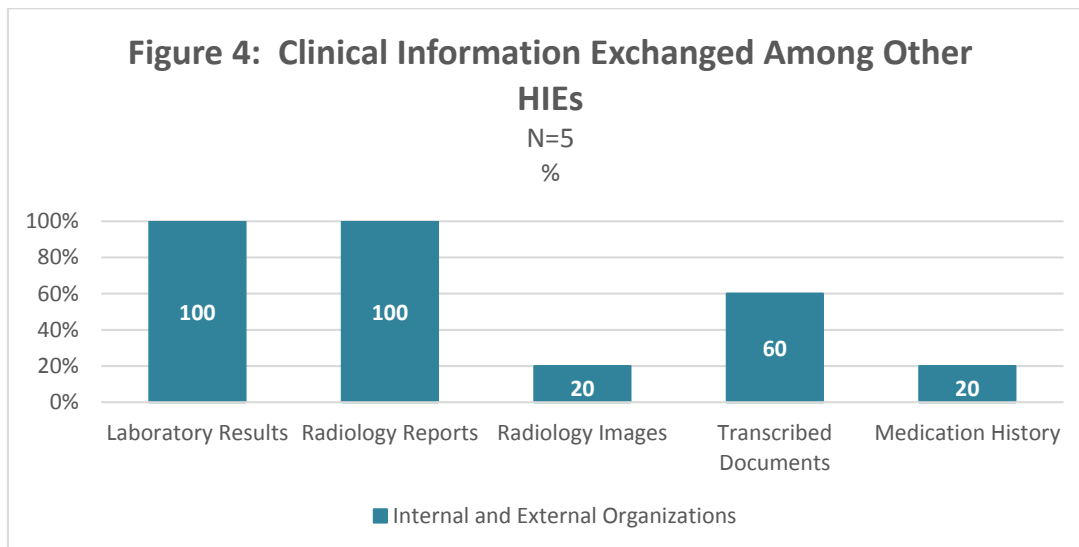
⁴⁵ CCD is an electronic document exchange standard that allows for the sharing of patient summary information, such as diagnosis and conditions, by health information systems (e.g. EHRs).

⁴⁶ The CRISP Query Portal allows authorized users the ability to query, via a web-based application, information such as patient demographics, laboratory results, radiology reports, discharge summaries, operative and consult notes, and prescription drug fill history. For more information about CRISP services, visit: www.crisphealth.org.

⁴⁷ Also doing business as, "ACES."

⁴⁸ For more information on the HIE registration process and a listing of all registered HIEs in Maryland, visit: mhcc.maryland.gov/mhcc/Pages/hit/hit_hie/hit_hie_registration.aspx.

⁴⁹ See Appendix D for more information on hospital participation with other HIEs.



Radiology

Hospitals benefit from access to radiology images (e.g. x-rays, MRIs, CT scans, etc.) and reports that occurred elsewhere, as repeat tests usually take place in emergency departments. While radiology reports are often available through an HIE, they typically do not include radiology images. Access to images and the associated reports can reduce duplicate testing and contribute to greater cost savings.^{50, 51, 52} Approximately 79 percent of hospitals report having a system in place to support electronic exchange of radiology images independent of an HIE; nearly 84 percent of these systems are integrated with a hospital EHR or radiology system.⁵³ Nearly all hospitals expressed an interest in utilizing CRISP for sharing radiology images.⁵⁴

Table 5: Radiology Image Exchange N=37	
Types of Exchange Partners	Hospitals %
Other hospitals and/or practices owned by the hospital/health system	73
Non-owned practices (i.e. practices not owned by the hospital/health system)	41
Other hospitals outside the hospital or health system	51

Note: N=37 represents the number of hospitals that have a non-HIE based system in place to support electronic exchange of radiology images.

⁵⁰ A study conducted by the journal Medical Care concluded that approximately \$19M in savings from avoided repeat images if every emergency department participated in an HIE.

⁵¹ Healthcare IT News, *HIE reduces repeat imaging in the EHR*, January 2014. Available at: www.healthcareitnews.com/news/hie-reduces-repeat-imaging-er.

⁵² Clinical Innovation Technology, *Image-Enabling Your HIE: Why Now?*, February 2014. Available at: www.vitalimages.com/docs/default-source/web_documents/cit_feb_2014_vital.pdf?sfvrsn=2.

⁵³ See Appendix E for a listing of radiology image sharing vendors.

⁵⁴ Two hospitals were not interested in using CRISP to exchange radiology images.

Medical Orders for Life-Sustaining Treatment

Most states have enacted laws to help facilitate communication concerning patients' medical preferences. These laws aim to provide individuals with autonomy concerning decisions about their health from initiation, continuation, withholding, or withdrawal of various medical interventions.⁵⁵ Maryland uses the Medical Orders for Life-Sustaining Treatment (MOLST) form.^{56, 57} MOLST is intended to simplify the process for providers and help avoid errors by creating one standardized form that can be used across health care settings; however, MOLST currently exists only in paper form.⁵⁸ An electronic version of MOLST (eMOLST) would enable the form to be more readily available to authorized providers as a patient transitions to different care settings, such as from the hospital to a skilled nursing facility. Currently, CRISP does not support eMOLST; nearly all hospitals expressed an interest in utilizing the State-Designated HIE for implementing an electronic version of the MOLST form.^{59, 60}

TELEHEALTH

Telehealth is the delivery of health education and services using telecommunications and related technologies in coordination with health care practitioners.⁶¹ Approximately 64 percent of hospitals report having telehealth capabilities.⁶² In comparison, roughly 52 percent of hospitals nationally have adopted telehealth, and about 10 percent report implementing telehealth.⁶³ Most hospitals provide teleradiology services where images are interpreted by a radiologist in another location.⁶⁴ Hospitals also report use of telehealth in emergency, cardiology, and internal medicine settings. More than half of the 30 hospitals that have adopted telehealth offer virtual consultations, a number that has nearly tripled since 2013.⁶⁵ Hospital use of telehealth for emergency services increased at about the same rate during this period (Figure 6).^{66, 67}

⁵⁵ Kapp, Marshall B., *Beyond Medical Advance Directives: Implementing POLST Paradigm in Florida*. Available at: med.fsu.edu/userFiles/file/MBK%20Article.pdf.

⁵⁶ MOLST forms are commonly referred to as Physician Orders for Life Sustaining Treatment (POLST) forms in other states. For more information on MOLST, visit: www.oag.state.md.us/Healthpol/.

⁵⁷ Maryland law stipulates that a copy of the MOLST form be kept in a patient's medical record. The MOLST form must accompany a patient if they are transferred to a health care facility and given to the patient or their health care agent within 48 hours of completion if the patient is transferred.

⁵⁸ Forms vary by state. For a copy of the Maryland MOLST form, visit: marylandmolst.org/docs/MOLST%20MM3%202013%20FINAL%20PROPOSED%2072613%20POSTED%2021714.pdf.

⁵⁹ Three hospitals were not interested in using CRISP for eMOLST.

⁶⁰ In 2011, MHCC was awarded roughly \$1.6M by ONC to, among other things, explore options to enable the availability of electronic advance directives. Upon award, MHCC convened a focus group in the beginning of 2012 consisting of various stakeholders throughout the State to assess technical and policy challenges related to electronic advance directives as well as MOLST forms. For more information, refer to the final report: mhcc.maryland.gov/mhcc/pages/hit/hit/documents/HIT_Strategy_Implement_Electronic_Adv_Directives_MOLST_Rpt_20120601.pdf.

⁶¹ The term telehealth encompasses both clinical and non-clinical services delivered remotely whereas the term telemedicine is restricted to clinical services only.

⁶² Eight hospitals report they are assessing telehealth; one hospital is in the implementation phase of telehealth; and nine hospitals indicated they are undecided about implementing telehealth.

⁶³ American Hospital Association, *The Promise of Telehealth For Hospitals, Health Systems and Their Communities*, January 2015. Available at: www.aha.org/research/reports/tw/15jan-tw-telehealth.pdf.

⁶⁴ The most common teleradiology solution utilized among hospitals include Nighthawk services that review radiology images during afterhours when hospitals often experience a shortage of radiologists.

⁶⁵ About 29 percent of Maryland hospitals provided teleconsultations in 2013. MHCC, *Health Information Technology, An Assessment of Maryland Hospitals*, October 2014.

⁶⁶ About 14 percent of Maryland hospitals provided emergency telehealth services in 2013. MHCC, *Health Information Technology, An Assessment of Maryland Hospitals*, October 2014.

⁶⁷ University of Maryland eCare offers remote patient monitoring, which is a program that expands lifesaving care in nine hospitals across the State served by remote ICU monitoring. For more information, visit: umms.org/services/ecare.

Table 6: Telehealth Services N=30	
Type of Service	%
Teleradiology	83
Teleconsultation	69
Emergency	45
Remote Monitoring	41
Telediagnosis	34
Telebehavioral health	17

Notes: N=30 represents the number of hospitals that have telehealth capabilities. These telehealth services coincide with the ten use cases developed by the Telemedicine Task Force in 2014.⁶⁸

The use of interactive audio/video technology ranks highest in terms of telehealth technology deployed by hospitals.⁶⁹ Hospitals also report use of mobile and home monitoring devices. These technologies include mobile platforms, such as tablets and smartphones, which use applications and other online services to track patients' health and wellness (Table 7).⁷⁰

Table 7: Telehealth Technologies N=30	
Type of Technology	%
Interactive Audio/Video	52
Mobile Devices	21
Home Monitoring Devices	17

Note: N=30 represents the number of hospitals that have telehealth capabilities.

POPULATION HEALTH MANAGEMENT

Hospitals are looking at innovative strategies to meet the goals of health care reform, which includes expanded use of health IT for purposes of population health management (PHM).⁷¹ PHM is the aggregation of patient data across various health IT systems to systematically address the preventative and chronic care needs of a defined group of patients. Hospitals use data analytic tools to support their PMH efforts. Data analytic tools leverage patient data to measure a variety of factors, including mortality, health status, disease

⁶⁸ MHCC, *Maryland Telemedicine Task Force Final Report*, October 2014. Available at:

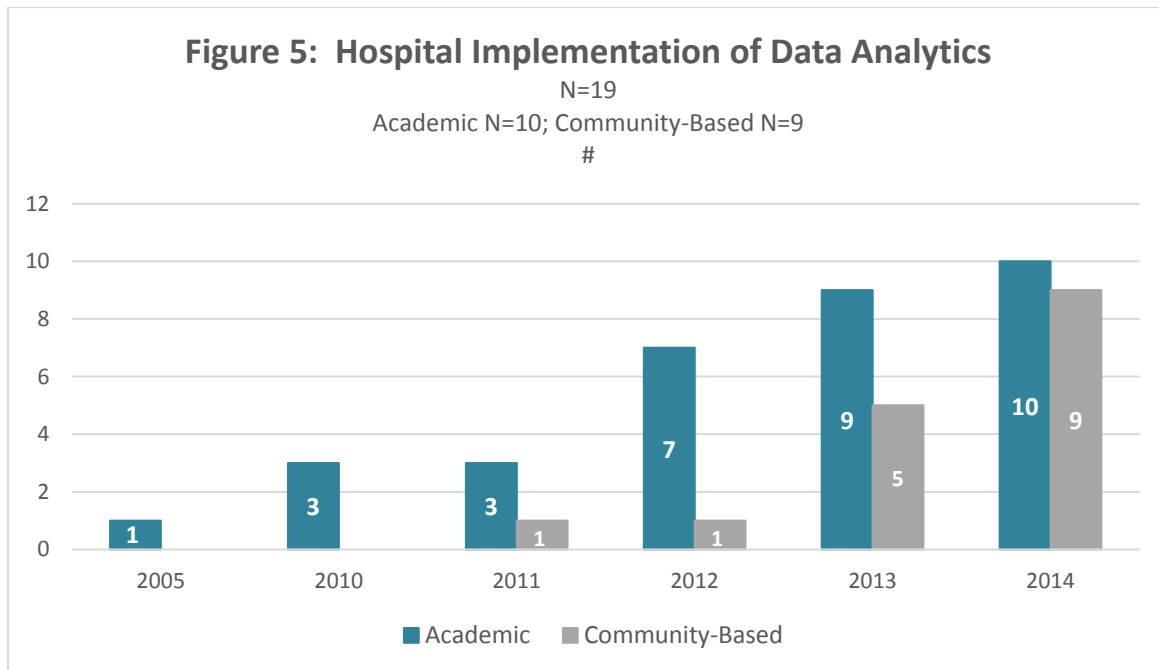
mhcc.maryland.gov/mhcc/pages/home/workgroups/documents/tlmd/tlmd_ttf_rpt_102014.pdf.

⁶⁹ Use of interactive audio/video technology is also supported by reimbursement mandates per Maryland law Maryland law, Md. Code Ann., Insurance § 15-139.

⁷⁰ See Appendix F for a listing of telehealth services provided by hospitals and the typed of technologies used.

⁷¹ HealthLeaders Media, *HIT Enters 'Post-EHR Era'*, February 2016. Available at: healthleadersmedia.com/content/TEC-325053/Healthcare-HIT-Enters-PostEHR-Era.

prevalence, and patient experience, to predict outcomes, measure trends, and establish correlations that drive quality of care and lower costs. Roughly 40 percent of hospitals utilize data analytic tools. These hospitals consist of ten academic hospitals and nine community-based hospitals. Over three quarters of these hospitals began using data analytic tools in recent years as a way to improve care coordination and reduce admissions and readmissions (Figure 5).⁷²



Hospitals report using three data analytic tools: (1) predictive analytics, (2) clinical data analytics; and (3) risk stratification. Predictive analytics proactively identifies potential high-risk patients.⁷³ Clinical data analytics is advanced use of CDS, which pulls together various sources of clinical data for managing a patient population.^{74, 75} Risk stratification allows hospitals to identify groups of patients across various levels of risk.⁷⁶ Among the 19 hospitals that use data analytics, about 47 percent report using all three of these data analytics tools (Figure 6).^{77, 78}

⁷² Health IT Analytics, *Healthcare Big Data Analytics Adoption Rises by 6% Since 2013*, May 2015. Available at: healthitanalytics.com/news/healthcare-big-data-analytics-adoption-rises-by-6-since-2013.

⁷³ The scope of predictive analytics includes CDS, readmission prevention, adverse event avoidance, chronic disease management, and patient matching. For more information on predictive analytics, visit: rockhealth.com/reports/predictive-analytics/.

⁷⁴ CDS includes rudimentary things, such as medication alerts and allergy warnings. Advanced use of CDS offers more capabilities for analytics to help guide clinical decision making based on practice guidelines and treatment algorithms. For more information visit: searchhealthit.techtarget.com/tip/Clinical-decision-support-tools-will-include-clinical-data-analytics.

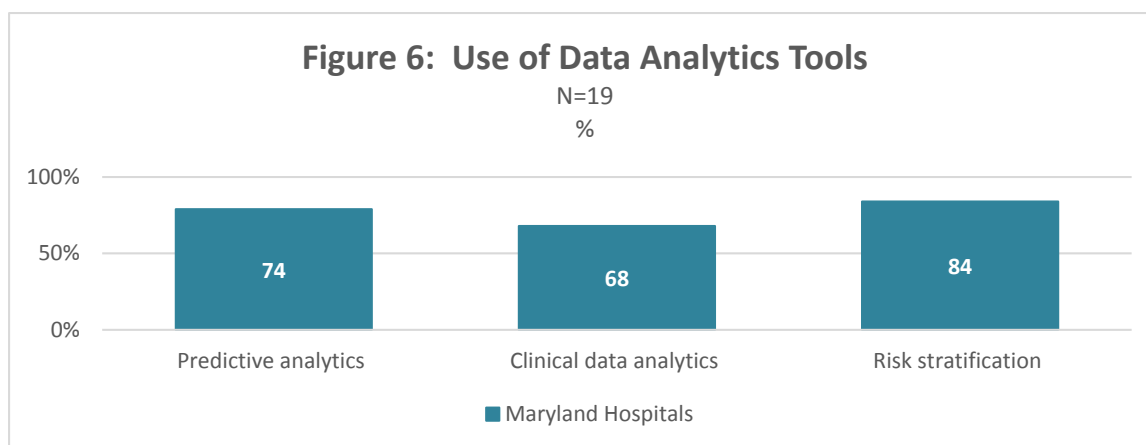
⁷⁵ Examples include laboratory data, such as blood tests, urinalysis, and microscopic tissue studies.

⁷⁶ Predictive analytics is the basis for risk stratification to identify patients who will generate high cost of care in the future. Populations are then classified into high, medium, and low risk. For more information, visit:

app.compendium.com/uploads/user/863cc3c6-3316-459a-a747-3323bd3b6428/4c5909e8-1708-4751-873e-4129cb2ed878/File/86f9d9a5e2f21fb11a5ad8ef2239a76e/1393861691669.pdf.

⁷⁷ Ten hospitals report they are assessing data analytics; ten hospitals indicated plans to use data analytics in 2015; five hospitals indicated plans to use data analytics after 2015; and 3 hospitals were undecided about use of data analytics.

⁷⁸ See Appendix G for a listing of population health management tools used by hospital.



Note: Some EHRs offer data analytics tools. Roughly 14 of the 19 hospitals report having data analytic tools integrated with their EHR.

Electronic care plans are used to support hospital PHM strategies. An electronic care plan is a comprehensive care planning tool that enables providers to collaboratively coordinate patient care pre and post discharge. Electronic care plans include information about patients pertaining to the planning, delivery, and evaluation of their care. Use of electronic care plans enables communication across providers to help reduce unnecessary emergency room visits and admissions for high risks patients.⁷⁹ About 36 percent of hospitals report using electronic care plans to assist with care coordination.⁸⁰

REMARKS

Health IT is a necessary component of a rapidly changing delivery system. In January 2014, Maryland entered into a five-year innovation grant from CMS for a new All-Payer Model Design (Model). The aim of the Model is to shift from a system that rewards additional volume of health services to one that improves the health of the population as a whole in a region. The Model relies on use of health IT as the underpinnings to support care delivery, improve quality, and reduce costs. Health IT is crucial to many other state strategies designed to improve the health of populations. The MHCC has been reporting on hospital health IT adoption since 2010. Each year, hospitals have continued to make notable progress in implementing health IT. This progress is largely attributed to the hard work and dedication of hospital CIOs to meet the changing financial, clinical, and population health-related demands with innovative technologies.

⁷⁹ HealthPartners, *Care plans reduce preventable emergency room visits, admissions*. Available at: www.healthpartners.com/ucm/groups/public/@hp/@public/documents/documents/cntrb_029679.pdf.

⁸⁰ See Appendix G for a listing of population health management tools used by hospital.

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APPENDIX A: 2014 SURVEY QUESTIONS

Listed below are the questions included in the 2014 Hospital Health IT Survey.

Section 1: Hospital Departments

- 1) Identify the total number of departments within your hospital? (enter value)

For purposes of this survey, hospital departments comprise the major patient care areas and are typical of any hospital despite the size of the facility.

Section 2: Electronic Health Records

- 2) How many departments use an EHR? (If 0, skip to *Planning* question)

a) Is your EHR certified by the Office of the National Coordinator for Health Information Technology Certification Program?

b) Identify your EHR vendor:

- 3) If no, is your hospital:

- Assessing EHR vendors
- Planning to implement an EHR by the end of 2015
- In the process of implementing an EHR – Expected completion date:
- Undecided about an EHR implementation strategy at this time

Section 3: Computerized Physician Order Entry

- 4) How many departments use CPOE where licensed health care professionals (e.g. MD, DO, NP, PA) can electronically enter patient care orders? (If 0, skip to *Planning* question)

a) Is this technology part of, or integrated with, the EHR system of any of the hospital's departments?

b) Which orders can be entered electronically:

- | | |
|---------------------------|-------------------|
| • Medications | • Referrals |
| • Laboratory | • Cardiology |
| • Radiology | • Other (specify) |
| • Nursing | |
| • Respiratory | |
| • Ultrasound | |
| • Physical Therapy | |
| • Occupational Therapy | |
| • Speech-Language Therapy | |
| • Consultation Requests | |
| • Dietary | |

5) If no, is your hospital:

- Assessing CPOE vendors
- Planning to implement CPOE by the end of 2015
- In the process of implementing CPOE – Expected completion date:
- Undecided about a CPOE implementation strategy at this time

Section 4: Clinical Decision Support

6) How many departments use CDS? (If 0, skip to *Planning* question)

- a) Is this technology part of, or integrated with, the EHR system of any of the hospital's departments?
- b) Has your hospital enabled the following CDS features?
 - Drug-drug contraindication checks
 - Drug-allergy contraindication checks
- c) Identify other CDS features that your hospital has implemented:

7) If no, is your hospital:

- Assessing CDS vendors
- Planning to implement CDS by the end of 2015
- In the process of implementing CDS – Expected completion date:
- Undecided about a CDS implementation strategy at this time

Section 5: Medication Administration

8) How many departments use electronic medication administration records (eMARs)? (If 0, skip to *Planning* question)

- a) Is this technology part of, or integrated with, the EHR system of any of the hospital's departments?

9) If no, is your hospital:

- Assessing eMAR vendors
- Planning to implement eMAR by the end of 2015
- In the process of implementing eMAR – Expected completion date:
- Undecided about an eMAR implementation strategy at this time

10) How many departments use a Bar Code Medication Administration (BCMA) system for medication administration at the bedside? (If 0, skip to *Planning* question)

- a) Is this technology part of, or integrated with, the EHR system of any of the hospital's departments?

11) If no, is your hospital:

- Assessing BCMA vendors
- Planning to implement BCMA by the end of 2015
- In the process of implementing BCMA – Expected completion date:
- Undecided about a BCMA implementation strategy at this time

Section 6: Infection Surveillance Software

12) How many departments use infection surveillance software (ISS) to manage infectious diseases? (If 0, skip to *Planning* question)

- Is this technology part of, or integrated with, the EHR system of any of the hospital's departments?
- Does your hospital's ISS produce reports using:
 - Batched surveillance processes (e.g. routine monitoring of public health)
 - Real-time surveillance process (e.g. the examination of specific threats as they arise)

13) If No, is your hospital:

- Assessing ISS vendors
- Planning to implement ISS by the end of 2015
- In the process of implementing ISS – Expected completion date:
- Undecided about an ISS implementation strategy at this time

Section 7: Electronic Prescribing

External E-Prescribing

14) How many departments electronically prescribe (e-prescribe) discharge medications to pharmacies outside of your hospital? (If 0, skip to *Planning* question)

- Is this technology part of, or integrated with, the EHR system of any of the hospital's departments?

15) If no, is your hospital:

- Assessing e-prescribing vendors for external purposes
- Planning to implement e-prescribing for external purposes by the end of 2015
- In the process of implementing e-prescribing for external purposes – Expected completion date:
- Undecided about an e-prescribing implementation strategy for external purposes at this time

Internal E-Prescribing

16) How many departments e-prescribe medications to your hospital's pharmacy to administer to patients within the hospital? (If 0, skip to *Planning* question)

- Is this technology part of, or integrated with, the EHR system of any of the hospital's departments?

17) If no, is your hospital:

- Assessing e-prescribing vendors for internal purposes
- Planning to implement e-prescribing for internal purposes by the end of 2015
- In the process of implementing e-prescribing for internal purposes – Expected completion date:
- Undecided about an e-prescribing implementation strategy for internal purposes at this time

Section 8: Health Information Exchange

Radiology Image Sharing

18) Does your hospital use a system to electronically transfer and/or receive radiology images? (If no, answer the *Planning* question)

- a) Is this technology part of, or integrated with, the EHR system of any of the hospital's departments?
- b) Identify your radiology image sharing vendor(s):

19) Does your hospital transfer and/or receive radiology images to:

- a) Other hospitals and/or practices owned by your hospital or health system
- b) Non-owned practices (i.e. practices that are not owned by your hospital or health system)
- c) Other hospitals outside your hospital or health system
- d) Other (specify)

20) Would your hospital be interested in using the State-Designated Health Information Exchange, the Chesapeake Regional Information System for our Patients, for radiology image sharing purposes if CRISP made this service available?

21) If no, is your hospital:

- Assessing radiology image sharing vendors
- Planning to implement a radiology image sharing vendor by the end of 2015
- In the process implementing a radiology image sharing vendor – Expected completion date:
- Undecided about a radiology image sharing strategy at this time

Maryland Order for Life Sustaining Treatment

22) Would your hospital be interested in using the State-Designated HIE, CRISP, to share electronic Maryland Order for Life Sustaining Treatment (MOLST) forms if CRISP made this service available?

Participation in a Local Health Information Exchange

23) Does your hospital participate with a local HIE: (If no, answer the *Planning* question)

A local HIE is an entity that provides organizational and technical capabilities for the exchange health care information electronically between or among health care entities in a particular region. For purposes of this survey, participation with a local HIE does NOT include participation with Maryland's State-Designated

HIE, CRISP. Exchange means either the transmission of data to the local HIE, and/or receipt of data, or access to data (e.g., query), from a local HIE.

- a) If yes, identify the local HIE name(s):
- b) Is the local HIE(s) owned and operated by your hospital (text box)

24) Does your hospital:

- Electronically transmit data to a local HIE (e.g. provide patient data on admissions/discharge/transfer summaries, radiology/laboratory reports, or other clinical information)
- Receive and/or access (i.e. query) patient data from the local HIE

25) Does your hospital electronically exchange data through the local HIE with internal organizations (e.g. hospitals and/or practices owned by your hospital or health system)?

- a) What types of data does your hospital electronically exchange with internal organizations via the local HIE:
 - Laboratory Results
 - Radiology Reports
 - Radiology Images
 - Transcribed documents (e.g. clinical care summaries)
 - Medication History
 - Other (specify)

26) Does your hospital electronically exchange data through the local HIE with external organizations (e.g. organizations not owned or affiliated with your hospital or health system)?

- a) What types of external organization does your hospital exchange data with through the local HIE?
 - Non-owned practices (i.e. practices that are not owned by your hospital or health system)
 - Other hospitals outside your hospital or health system
 - State Agencies (e.g. Department of Health and Mental Hygiene)
 - Federal Agencies (e.g. Centers for Medicare & Medicaid Services)
 - Other (specify)
- b) What types of data does your hospital electronically exchange with external organizations via the local HIE:
 - Laboratory Results
 - Radiology Reports
 - Radiology Images
 - Transcribed documents (e.g. clinical care summaries)

- Medication History
- Other (specify)

27) If no, is your hospital:

- Assessing participation with a local HIE
- Planning to participate with a local HIE by the end of 2015
- In the process of connecting with a local HIE – Expected completion date:
- Undecided about a local HIE strategy at this time

Section 9: Patient Portals

28) How many departments use a patient portal? (If 0, skip to *Planning* question)

- a) Is this technology part of, or integrated with, the EHR system of any of the hospital's departments?

29) What types of services does your hospital provide to patients through your patient portal?

- | | |
|---|--|
| • Pay bill | • Preregister for services |
| • Check test results | • Accept patient-generated data (e.g. allowing patients with diabetes or congestive heart failure to submit self-test results) |
| • Access visit summary | • Access full medical record |
| • Download information about a hospital admission | • Request electronic copy of medical record |
| • Renew/refill prescription | • E-mail provider |
| • Self-management tools for chronic conditions | |
| • Update insurance information | |

30) If No, is your hospital:

- Assessing patient portal vendors
- Planning to implement a patient portal by the end of 2015
- In the process of implementing a patient portal – Expected completion date:
- Undecided about a patient portal implementation strategy at this time

Section 10: Telehealth

31) Has your hospital adopted telehealth? (If no, answer the *Planning* questions)

Note: Telehealth is the delivery of health education and services using telecommunications and related technologies in coordination with health care practitioners. Telehealth encompasses both clinical and non-clinical services delivered remotely; the term telemedicine refers to the delivery of clinical services delivered remotely. For purposes of this survey, MHCC is using the term telehealth, which includes telemedicine and use of telehealth technologies including but not limited to:

- *Real-time audio video conferencing (virtually connects patients with practitioners, sometimes referred to as virtual visits, and may serve as an alternative to an in-person visit)*
- *Store-and-forward software (uses non-real-time communication, including email or other electronic transmission methods, to send clinical information, such as an x-ray, to health care practitioners for clinical review at a convenient time offline)*
- *Remote monitoring devices (collects and transmits data on specific health indicators, such as blood pressure or heart rate, to health care practitioners for monitoring/tracking purposes)*
- *Mobile health (mHealth) devices (uses mobile communications devices, such as smartphones, for health services and information)*

32) How does your hospital use telehealth:

- Internal to your organization (e.g. specialist consultations within the hospital)
- External to your organization (e.g. radiology report readings from an outside organization)

33) Was your hospital's 2014 telehealth strategy:

- Hospital-wide (i.e. diffusion of telehealth capabilities in all hospital departments)
- Department(s) specific – Identify the areas of focus

Clinical

- | | |
|---|--|
| • Heart (includes cardiology, vascular surgery, and cardiothoracic surgery) | • OB-GYN |
| • Trauma and emergency (includes trauma and emergency surgery, emergency internal medicine, central ICU) | • Pediatrics |
| • Gastroenterology (includes gastroenterology, gastroenterology survey, and endoscopy unit) | • Geriatric medicine |
| • Surgery (includes day surgery, orthopedics, sports medicine, neurosurgery, minimally invasive surgery, urology, and anesthesiology) | • Ophthalmology |
| • Internal medicine (includes oncology, respiratory medicine, neurology, endocrinology, nephrology, hematology, and immunology) | • Behavioral health |
| | • Rehabilitation therapies (e.g. physical therapy, occupational therapy) |
| | • Infectious diseases |
| | • Dermatology |
| | • Other (specify) |

Technical

- Pathology
- Laboratory
- Pharmacy
- Radiology
- Other (specify)

34) How many hospital departments provide telehealth services for the following purposes?

- Tele-radiology (i.e. the transmission and evaluation of radiological patient images, such as x-rays, CTs, and MRIs, from one location to another)
- Tele-diagnosis (i.e. the process whereby a disease diagnosis or prognosis is made by evaluating data transmitted between distant medical facilities)
- Tele-behavioral health (i.e. using technology to virtually provide mental health services from a distance)
- Tele-consultation (i.e. virtually connecting health care practitioners with other health care practitioners and/or patients)
- Emergency (i.e. connections between two medical facilities in emergent situations)
- Remote Monitoring (i.e. electronic data capture and Internet-enabled review by health care practitioners, particularly used in the management of chronic diseases)
- Other (specify)

35) How many hospital departments use the following telehealth technologies to provide telehealth services?

- Cloud-based systems (i.e. a platform enabling health care practitioners and patients to communicate virtually) for:
 - Video conferencing
 - Messaging
 - Scheduling online meetings
 - Securely uploading and exchanging files electronically (e.g. EHRs, images, input data from other telehealth technologies, etc.)
 - Other (specify)
- Home monitoring devices (i.e. technologies that support post-discharge, home health, and chronic care management)
- Interactive video/audio (i.e. synchronous (real-time) computer based communications between health care practitioners and/or patients)
- Store-and-forward software (i.e. asynchronous (not real-time) computer based communications between health care practitioners and/or patients)
- Mobile devices (i.e. iPads, tablets, cell phones, etc.)
- Robotics (i.e. a robot that allows for real-time audio and video communications and/or enables a physician to operate the robot from a remote location using a joystick or mouse connected to a computer over an Internet connection)
- Other (specify)

36) If No, is your hospital:

- Assessing telehealth
- Planning to implement telehealth by the end of 2015
- In the process of implementing telehealth – Expected completion date:
- Undecided about a telehealth implementation strategy at this time

Section 11: EHR Incentive Programs

37) Identify your hospital's participation in the Medicare and Medicaid EHR Incentive Programs during program year 2014:

- Medicaid EHR Incentive Program only
- Medicare EHR Incentive Program only
- Both Medicare and Medicaid EHR Incentive Programs
- Neither the Medicare nor the Medicaid EHR Incentive Programs (If no, answer the *Planning* question)

38) Has your hospital received notice and/or been audited by CMS for Meaningful Use?

[If hospital answers MEDICAID ONLY]

39) Identify your hospital's participation in the Medicaid EHR Incentive Program in 2014:

- Adopt/Implement/Upgrade (AIU)
- Demonstrated Meaningful Use Stage 1
- Demonstrated Meaningful Use Stage 2

40) Is your hospital (select one):

- Planning to attest for the *Medicaid* EHR Incentive Program in program year 2015
- Planning to attest for the *Medicare* EHR Incentive Program in program year 2015
- Planning to attest to both the *Medicaid and Medicare* EHR Incentive Programs in program year 2015
- Undecided about participating in the *Medicaid or Medicare* EHR Incentive Programs in program year 2015

If undecided, is your hospital experiencing any challenges and/or you're your hospital need assistance in order to continue participating in program year 2015?

[If hospital answers MEDICARE ONLY or BOTH MEDICAID & MEDICARE]

41) What stage of Meaningful Use did your hospital attest to in program year 2014?

- Stage 1
- Stage 2

42) Is your hospital:

- Planning to attest for the *Medicaid* EHR Incentive Program in program year 2015
- Planning to attest for the *Medicare* EHR Incentive Program in program year 2015
- Planning to attest to both the *Medicaid and Medicare* EHR Incentive Programs in program year 2015
- Undecided about participating in the *Medicaid or Medicare* EHR Incentive Programs in program year 2015

If undecided, is your hospital experiencing any challenges and/or you're your hospital need assistance in order to continue participating in program year 2015?

[If hospital answers NEITHER Medicaid or Medicare]

43) Please explain why your hospital chose not to participate in the Medicare and Medicaid EHR Incentive Programs during calendar year 2014.

- Cost
- Technical resources
- Medicaid patient population does not meet the required 10 percent threshold
- Competing priorities (specify)
- Other (specify)

44) Is your hospital:

- Planning to attest for the *Medicaid* EHR Incentive Program in program year 2015
- Planning to attest for the *Medicare* EHR Incentive Program in program year 2015
- Planning to attest to both the *Medicaid or Medicare* EHR Incentive Programs in program year 2015
- Undecided about participating in the *Medicaid or Medicare* EHR Incentive Programs in program year 2015

If undecided, is your hospital experiencing any challenges and/or you're your hospital need assistance in order to continue participating in program year 2015?

Section 12: Data Analytics for Population Health Management

Population health management includes population-based activities that systematically address the preventative and chronic care needs of every patient with a focus on reducing health care costs and improving health outcomes. For purposes of this survey, data analytics includes use of business intelligence applications that measure mortality, health status, disease prevalence, and patient experience, among other things, to predict outcomes, measure trends and establish correlations that drive quality of care and lower costs. Assessing the health status of population segments can help identify areas of population health management that may need to be strengthened and/or modified.

45) Does your hospital use data analytics tools for population health management? (If no, answer the Planning question)

- If yes, specify the date when your hospital began using data analytics:

46) If no, is your hospital:

- Assessing use of data analytics for population health management purposes
- Planning to use data analytics for population health management purposes in 2015
- Planning to use data analytics for population health management purposes after 2015 – Expected completion date:
- Undecided about use of data analytics for population health management at this time

47) Are the data analytic tools used for population health management part of, or integrated with, the EHR system of any of the hospital's departments?

a) Identify your data analytic tools vendor(s):

48) What types of data analytics tools does your hospital utilize:

- Predictive analytics (e.g. identifies potential high-risk patients before they need expensive care)
- Clinical data analytics (e.g. examines clinical data to determine a diagnosis and treatment regimen, for instance, laboratory data, such as blood tests, urinalysis, and microscopic tissue studies)
- Risk stratification (includes tools that identify population needs across all levels of risk so strategies on the types of outreach and interventions can be established to address patient needs across the continuum of care)
- Other (specify)

49) Does your hospital utilize electronic care plans for population health management?

For purpose of this survey, an electronic care plan is a comprehensive care planning tool that enables all provider types involved in a patient's care to coordinate/collaborate patient care pre/post discharge by facilitating access to patient information, planning, delivery and evaluation of patient care.

- Yes
- No

APPENDIX B: HEALTH IT DEFINITIONS

Barcode Medication Administration (BCMA): Use of a barcode identification scanning device to provide verification of the correct patient and medication at the point-of-care.

Clinical Decision Support (CDS): Computer application designed to assist in the clinical decision-making process at the point of care to help prevent adverse events. CDS encompasses tools such as drug-drug interaction checks, drug-allergy interaction checks, basic dosing guidance, clinical guidelines, patient specific reports, and alerts/reminders to providers

Computerized Physician Order Entry (CPOE): Enables providers to electronically generate patient orders, such as medications, tests, and other procedures, from a computer or mobile device.

Electronic Health Record (EHR): A system that makes clinical information available electronically; contains medical histories of patients and offers evidence based tools to assist in the clinical decision-making process.

Electronic Medication Administration Records (eMARs): A record of medication administered to a patient by a health care practitioner; helps improve tracking and monitoring of patients' medications and can prevent lost or misinterpreted records.

Electronic Prescribing (e-prescribing): Enables prescriptions to be generated, transmitted, and filed electronically; can include CDS as well as information on patient eligibility, formulary, and medication history.

APPENDIX C: HOSPITAL HEALTH INFORMATION TECHNOLOGY IMPLEMENTATION

The table below details diffusion of health IT by hospital, including the number and percent of hospital departments that utilize the specified technology. Hospital adoption of a patient portal and telehealth are noted with a check mark (✓). Strikethroughs (-) indicate technologies that have not yet adopted by a hospital. For detailed information on hospital telehealth capabilities, refer to Appendix G. For detailed information on hospital use of population health management tools, including data analytics and electronic care plans, refer to Appendix H.

Health IT Implementation													
Hospitals N=47	EHRs		CPOE		eMARs		BCMA		e- Prescribe		Patient Portal	Telehealth	
	Departments										Implemented ✓		
	Total #	#	%	#	%	#	%	#	%	#			%
Anne Arundel Medical Center	39	39	100	39	100	39	100	39	100	34	87	✓	✓
Atlantic General Hospital	7	6	86	7	100	5	71	5	71	5	71	✓	✓
Bon Secours Baltimore Health System	8	8	100	8	100	8	100	8	100	8	100	✓	✓
Calvert Memorial Hospital	26	18	69	15	58	13	50	12	46	8	31	✓	✓
Carroll Hospital Center	15	12	80	15	100	11	73	11	73	2	13	✓	✓
Doctors Community Hospital	30	30	100	30	100	16	53	12	40	-	-	✓	✓
Fort Washington Medical Center	13	13	100	5	38	2	15	2	15	-	-	✓	✓
Frederick Memorial Hospital	17	17	100	16	94	15	88	16	94	1	6	✓	✓
Garrett County Memorial Hospital	10	10	100	10	100	6	60	6	60	6	60	✓	-
Greater Baltimore Medical Center	149	124	83	37	25	28	19	28	19	3	2	✓	-
Holy Cross Germantown Hospital	12	12	100	12	100	12	100	8	71	-	-	✓	✓
Holy Cross Hospital	28	28	100	28	100	28	100	20	67	-	-	✓	✓
Howard County General Hospital	135	67	50	48	36	20	15	20	15	1	1	✓	✓
Johns Hopkins Bayview Medical Center	24	24	100	24	100	23	96	24	100	-	-	✓	-

Health IT Implementation													
Hospitals N=47	EHRs		CPOE		eMARs		BCMA		e- Prescribe		Patient Portal	Telehealth	
	Departments											Implemented ✓	
	Total #	#	%	#	%	#	%	#	%	#	%		
Johns Hopkins Hospital	17	9	53	9	53	9	53	2	12	-	-	✓	✓
Laurel Regional Hospital	24	24	100	24	100	24	100	24	100	24	100	-	✓
McCready Health	11	11	100	6	55	9	82	3	27	4	36	✓	✓
MedStar Franklin Square Medical Center	20	20	100	20	100	20	100	20	100	20	100	✓	✓
MedStar Good Samaritan Hospital	132	22	17	22	17	15	11	14	11	15	11	✓	-
MedStar Harbor Hospital	22	19	86	9	41	10	45	10	45	10	45	✓	-
MedStar Montgomery Medical Center	11	11	100	11	100	11	100	10	91	10	91	✓	✓
MedStar Southern Maryland Hospital	60	59	98	59	98	30	50	30	50	30	50	✓	-
MedStar St. Mary's Hospital	16	16	100	16	100	16	100	11	69	16	100	✓	✓
MedStar Union Memorial Hospital	66	66	100	66	100	20	30	20	30	20	30	✓	-
Mercy Medical Center	45	45	100	11	24	9	20	9	20	-	-	✓	-
Meritus Medical Center	37	37	100	37	100	19	51	19	51	4	11	✓	✓
Northwest Hospital Center	13	13	100	13	100	13	100	13	100	1	8	✓	-
Peninsula Regional Medical Center	26	26	100	26	100	26	100	25	96	26	100	✓	✓
Prince Georges Hospital Center	41	41	100	41	100	41	100	39	95	41	100	-	✓
Shady Grove Adventist Hospital	28	28	100	28	100	28	100	28	100	20	71	✓	✓
Sinai Hospital	15	15	100	15	100	15	100	15	100	2	13	✓	-
St. Agnes Hospital	6	4	67	3	50	2	33	1	17	2	33	✓	-

Health IT Implementation													
Hospitals N=47	EHRs		CPOE		eMARs		BCMA		e- Prescribe		Patient Portal	Telehealth	
	Total #	Departments										Implemented ✓	
		#	%	#	%	#	%	#	%	#	%		
Suburban Hospital	100	75	75	50	50	50	50	25	25	10	100	✓	-
Union Hospital of Cecil County	33	33	100	33	100	33	100	33	100	33	100	✓	✓
University of Maryland Baltimore Washington Medical Center	6	6	100	6	100	6	100	6	100	6	100	✓	-
University of Maryland Charles Regional Medical Center	20	20	100	15	75	10	50	10	50	-	-	✓	✓
University of Maryland Harford Memorial Hospital	8	8	100	8	100	8	100	6	75	-	-	✓	✓
University of Maryland Medical Center	78	78	100	77	99	78	100	10	13	-	-	✓	✓
University of Maryland Medical Center Midtown Campus	46	46	100	46	100	9	20	9	20	3	7	-	-
University of Maryland Rehabilitation & Orthopedic Institute	6	6	100	6	100	6	100	-	-	6	100	✓	-
University of Maryland Shore Medical Center at Chestertown	6	6	100	5	80	3	50	3	50	-	-	✓	✓
University of Maryland Shore Medical Center at Dorchester	7	7	100	6	86	4	57	4	57	-	-	✓	✓
University of Maryland Shore Medical Center at Easton	15	15	100	11	73	9	60	9	60	-	-	✓	✓
University of Maryland St. Joseph Medical Center	21	21	100	21	100	21	100	21	100	21	100	✓	-
University of Maryland Upper Chesapeake Medical Center	12	12	100	12	100	12	100	10	83	-	-	✓	✓
Washington Adventist Hospital	22	22	100	21	95	21	95	17	77	16	73	✓	✓
Western Maryland Health System	24	24	100	18	75	22	92	22	92	-	-	✓	-
Adoption Rate:		100		100		100		98		68		94	62

APPENDIX D: INCENTIVE PAYMENTS RANK LISTING BY HOSPITAL

Hospitals rank as follows from the highest to lowest amount of incentive payments received from 2011 through September 2015.⁸¹

1. Sinai Hospital
2. Johns Hopkins Bayview Medical Center
3. Holy Cross Hospital
4. Peninsula Regional Medical Center
5. Frederick Memorial Hospital
6. Johns Hopkins Hospital
7. MedStar Franklin Square Medical Center
8. Saint Agnes Hospital
9. Western Maryland Health System
10. Anne Arundel Medical Center
11. Mercy Medical Center
12. University of Maryland Medical Center
13. Northwest Hospital
14. University of Maryland Baltimore Washington Center
15. Meritus Medical Center
16. MedStar Good Samaritan Hospital
17. University of Maryland Upper Chesapeake Medical Center
18. Carroll Hospital Center
19. Doctors Community Hospital
20. MedStar Union Memorial Hospital
21. Shady Grove Medical Center
22. Laurel Regional Hospital
23. MedStar Harbor Hospital
24. Howard County General Hospital
25. University of Maryland Medical System, Shore Regional Health, Shore Medical Center at Dorchester*
26. University of Maryland Medical System, Shore Regional Health, Shore Medical Center at Easton*
27. Washington Adventist Hospital
28. Greater Baltimore Medical Center

⁸¹ Data from the Department of Health and Mental Hygiene as of September 2015. Hospital incentive payment amounts vary according to years of participation and patient population.

29. Calvert Memorial Hospital
30. Union Hospital Cecil County
31. Suburban Hospital
32. University of Maryland Charles Regional Medical Center
33. MedStar Montgomery Medical Center
34. MedStar St. Mary's Hospital
35. University of Maryland Harford Memorial Hospital
36. Atlantic General Hospital
37. Prince George's Hospital Center
38. MedStar Southern Maryland Hospital Center
39. McCready Health
40. University of Maryland Medical System, Shore Regional Health, Shore Medical Center at Chestertown
41. Garrett County Memorial Hospital
42. Fort Washington Medical Center
43. University of Maryland Rehabilitation and Orthopedic Institute
44. University of Maryland Midtown Campus
45. Bon Secours Baltimore Health System
46. University of Maryland St Joseph Medical Center

**Incentive payments are combined for both the University of Maryland Shore Medical Center at Dorchester and University of Maryland Shore Medical Center at Easton; incentive payments are calculated based off a point in time at which both hospitals combined CMS Certification Numbers.*

The chart below details the breakdown of the share of incentive payments received among health systems and community hospitals.

Share of Incentive Payments			
Hospital Type N=47	Share %		
	Medicare	Medicaid	Medicare & Medicaid
Health Systems N=24	44.2	55.2	47.4
Community Hospitals N=23	55.8	44.8	52.6

Note: Health Systems include: Johns Hopkins Medical System; Dimensions Healthcare; MedStar Health; and University of Maryland Medical System.

APPENDIX E: PARTICIPATION WITH OTHER HIES

The tables below detail hospital participation with four other hospital-owned HIEs registered with MHCC: Adventist Healthcare; Calvert Memorial Hospital; Frederick Memorial Hospital; and Peninsula Regional Medical Center.⁸² A check mark (✓) indicates hospital exchange partners and the types of clinical information being exchanged.

Participation with Other HIEs					
Hospitals N=5	Internal Partners	External Partners			
		<i>Non-Owned Practices</i>	<i>Other Hospitals Outside Hospital/Health System</i>	<i>State Agencies (e.g. DHMH)</i>	<i>Federal Agencies (e.g. CMS)</i>
Calvert Memorial Hospital	✓	✓			
Frederick Memorial Hospital	✓	✓		✓	
Peninsula Regional Medical Center	✓	✓		✓	
Shady Grove Adventist Hospital	✓	✓			
Washington Adventist Hospital	✓	✓			
Total (%):	100	100	0	40	0

⁸² Participation with these other HIEs are in addition to hospital participation with the State-Designated HIE, CRISP.

Clinical Information Exchanged Using Other HIEs

Hospitals N=5	Type of Clinical Information				
	<i>Laboratory Reports</i>	<i>Radiology Reports</i>	<i>Radiology Images</i>	<i>Transcribed Documents</i>	<i>Medication History</i>
Calvert Memorial Hospital	✓	✓		✓	
Frederick Memorial Hospital	✓	✓	✓	✓	✓
Peninsula Regional Medical Center	✓	✓		✓	
Shady Grove Adventist Hospital	✓	✓			
Washington Adventist Hospital	✓	✓			
Total (%):	100	100	20	60	20

APPENDIX F: RADIOLOGY IMAGE SHARING VENDORS

The table below details how many hospitals use the specified radiology image sharing vendor. Some hospitals use more than one vendor.

Radiology Image Sharing Vendors	
Vendors	Hospitals #
Carestream	2
Cerner	2
CPSI	1
DR Systems	1
EasyViz	1
Emageon	1
EPIC	1
Fuji	3
GE	5
Imaging On Call	1
ImageShare	1
Life Image	2
McKesson	7
Meditech	1
MedStar	3
Merge	2
Novarad	1
Phillips	4
Siemens	2
UltraVisual	1

APPENDIX G: TELEHEALTH CAPABILITIES

The tables below detail hospital telehealth capabilities including the number and percent of hospital departments that have implemented the specified telehealth service and technology. Strikethroughs (-) indicate a telehealth service or technology not yet implemented by a hospital.

Telehealth Capabilities																			
Hospitals N=30	Telehealth Services										Telehealth Technologies								
	Tele-radiology		Tele-consultation		Emergency		Remote Monitoring		Tele-diagnosis		Tele-behavioral Health		Interactive Video/Audio		Mobile Devices		Home Monitoring Devices		
																			Departments
Total #	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	
Anne Arundel Medical Center	39	-	-	1	3	-	-	-	-	-	-	-	-	1	3	-	-	-	-
Atlantic General Hospital	7	1	14	1	14	-	-	-	-	1	14	1	14	1	14	5	71	-	-
Bon Secours Baltimore Health System	8	8	100	1	13	1	13	1	13	-	-	-	-	1	13	-	-	-	-
Calvert Memorial Hospital	26	1	4	-	-	-	-	-	-	-	-	-	-	1	4	-	-	-	-
Carroll Hospital Center	15	1	7	2	13	1	7	-	-	1	7	-	-	2	13	-	-	1	7
Doctors Community Hospital	30	1	3	-	-	1	3	-	-	-	-	1	3	1	3	12	40	-	-
Fort Washington Medical Center	13	1	8	-	-	1	8	-	-	-	-	-	-	-	-	-	-	-	-
Frederick Memorial Hospital	17	1	6	3	18	-	-	1	6	1	6	-	-	-	-	1	6	1	6
Holy Cross Germantown Hospital	12	12	100	4	33	2	17	6	50	12	100	1	8	-	-	-	-	-	-
Holy Cross Hospital	28	28	100	4	14	2	7	6	21	28	100	1	4	-	-	-	-	-	-
Howard County General Hospital	135	1	1	1	1	-	-	-	-	1	1	-	-	-	-	-	-	-	-

Telehealth Capabilities																			
Hospitals N=30	Telehealth Services												Telehealth Technologies						
	Tele-radiology			Tele-consultation		Emergency		Remote Monitoring		Tele-diagnosis		Tele-behavioral Health		Interactive Video/Audio		Mobile Devices		Home Monitoring Devices	
	Departments																		
	Total #	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
Johns Hopkins Hospital	17	2	12	1	6	-	-	1	6	3	18	-	-	-	-	-	-	1	6
Laurel Regional Hospital	24	-	-	1	4	1	4	1	4	-	-	-	-	1	4	1	4	-	-
McCreedy Health	11	1	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MedStar Franklin Square Medical Center	20	1	5	1	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MedStar Montgomery Medical Center	11	11	100	1	9	1	9	-	-	1	9	-	-	-	-	-	-	-	-
MedStar St. Mary's Hospital	16	1	6	1	6	1	6	-	-	2	13	-	-	2	18	-	-	-	-
Meritus Medical Center	37	1	3	1	3	1	3	-	-	-	-	-	-	-	-	-	-	-	-
Peninsula Regional Medical Center	26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	3
Prince Georges Hospital Center	41	-	-	1	2	1	2	-	-	-	-	-	-	1	2	1	2	-	-
Shady Grove Adventist Hospital	28	21	75	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Union Hospital of Cecil County	33	1	3	1	3	-	-	1	3	1	3	-	-	1	3	33	100	1	3
University of Maryland Charles Regional Medical Center	20	-	-	-	-	-	-	1	5	-	-	-	-	10	13	-	-	-	-
University of Maryland Harford Memorial Hospital	8	1	13	-	-	1	13	-	-	-	-	1	13	-	-	-	-	-	-

Telehealth Capabilities																					
Hospitals N=30	Telehealth Services												Telehealth Technologies								
	Total #		Tele-radiology		Tele-consultation		Emergency		Remote Monitoring		Tele-diagnosis		Tele-behavioral Health		Interactive Video/Audio		Mobile Devices		Home Monitoring Devices		
			Departments																		
			#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	
			#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	
University of Maryland Medical Center	78	-	-	10	13	-	-	10	13	-	-	-	-	-	-	-	-	-	-	-	
University of Maryland Shore Medical Center at Chestertown	6	1	17	-	-	1	17	1	17	-	-	-	-	1	17	-	-	-	-	-	
University of Maryland Shore Medical Center at Dorchester	7	1	14	1	14	-	-	1	14	-	-	-	-	1	14	-	-	-	-	-	
University of Maryland Shore Medical Center at Easton	15	1	7	1	7	-	-	1	7	-	-	-	-	1	7	-	-	-	-	-	
University of Maryland Upper Chesapeake Medical Center	12	1	8	1	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Washington Adventist Hospital	22	15	68	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Total (%):		79		69		45		41		34		17		52		21		17			

APPENDIX H: POPULATION HEALTH MANAGEMENT

The table below details hospitals implementation of PHM tools, including data analytics and electronic care plans. A check mark (✓) indicates hospital use of the specified PHM tool. Strikethroughs (-) indicate a PHM tool not yet implemented by a hospital.

Population Health Management Tools				
Hospitals	Data Analytics N=19			Electronic Care Plans N=17
	Predictive Analytics N=14	Clinical Data Analytics N=13	Risk Stratification N=16	
	Implemented ✓			
Anne Arundel Medical Center	✓	✓	✓	✓
Atlantic General Hospital	-	-	-	-
Bon Secours Baltimore Health System	✓	✓	✓	✓
Frederick Memorial Hospital	✓	✓	✓	-
Garrett County Memorial Hospital	-	-	-	✓
Greater Baltimore Medical Center	✓	-	-	-
Holy Cross Germantown Hospital	✓	✓	✓	✓
Holy Cross Hospital	✓	✓	✓	✓
Johns Hopkins Bayview Medical Center	-	✓	✓	✓
Johns Hopkins Hospital	-	✓	✓	-
MedStar Franklin Square Medical Center	-	-	✓	-
MedStar Harbor Hospital	-	-	✓	✓
MedStar Montgomery Medical Center	✓	✓	-	-

Population Health Management Tools				
Hospitals	Data Analytics N=19			Electronic Care Plans N=17
	Predictive Analytics N=14	Clinical Data Analytics N=13	Risk Stratification N=16	
Implemented ✓				
MedStar Southern Maryland Hospital	-	-	✓	✓
MedStar St. Mary's Hospital	-	-	-	✓
Meritus Medical Center	✓	-	-	-
Peninsula Regional Medical Center	-	-	-	✓
Shady Grove Adventist Hospital	✓	✓	✓	-
Suburban Hospital	-	✓	-	-
University of Maryland Baltimore Washington Medical Center	✓	✓	✓	✓
University of Maryland Harford Memorial Hospital	✓	-	✓	✓
University of Maryland Medical Center	-	-	-	✓
University of Maryland Medical Center Midtown Campus	-	-	-	✓
University of Maryland Rehabilitation & Orthopedic Institute	✓	✓	✓	✓
University of Maryland Upper Chesapeake Medical Center	✓	-	✓	✓
Washington Adventist Hospital	✓	✓	✓	-
Western Maryland Health System	-	-	-	✓
Total (%):	74	68	84	36



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